REMARKS

As a preliminary matter, Applicant appreciates the courtesies extended to Applicant's representative in the telephonic interview conducted with the Examiner on November 23, 2004. The Office Action states that claims 1-6 have been rejected, claims 9-10 are withdrawn from consideration, and claims 7-8 and 12-13 are allowed. In the telephonic interview conducted with the Examiner on November 23, 2004, the Examiner indicated that the status of the claims in the Office Action was incorrect. The Examiner confirmed that claims 1-6 were rejected, claims 10-11 were withdrawn from consideration and claims 7-9 and 12-13, as indicated above, were allowed.

Claims 1-9 and 12-20 are all of the claims presently pending in the application. Claims 1-9 have been amended to more particularly define the invention. Claims 10-11 have been canceled without prejudice or disclaimer. Claims 14-20 have been added to claim additional features of the invention.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Applicant gratefully acknowledges the Examiner's indication that claims 7-9 and 12-13 were allowed. However, Applicant respectfully submits that all of claims 1-9 and 12-20 are allowable.

Claims 1-2 and 5-6 stand rejected under 35 U.S.C. § 102(b) as being anticipated by IBM Technical Disclosure Bulletin (TDB-ACC-NO: NN75101486, Vol. 18, Issue 5) (hereinafter "IBM"). Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over IBM in view of Fujitsu LTD (JP 53016396A) (hereinafter "Fujitsu"). Claim 3 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over IBM in view of Kawama et al. (U.S. Patent No. 5,665,607").

These rejections are respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention (e.g., as defined in claim 1) is directed to a method of producing a crystal growth substrate. The method includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate, growing a sapphire crystal on the sapphire growth surface of the seed substrate to thereby form a sapphire substrate and removing the seed substrate selectively from the sapphire substrate formed by the growing a sapphire crystal.

Conventional semiconductor light-emitting elements formed on a sapphire substrate are produced by using a sapphire substrate having a thickness of not smaller than 100 μm. As a condition for carrying out the separation step of the sapphire substrate, the sapphire substrate must be sufficiently thinner than 100 μm. Therefore, the thickness of the sapphire substrate must be reduced prior to the separation step. The sapphire substrate is very rigid so that processing such as grinding cannot be easily applied to the sapphire substrate. Therefore, it is very difficult to process the shape of the rear surface of the sapphire substrate in order to improve efficiency in extracting light to the polished surface located on the rear side of the crystal growth surface.

The claimed invention of exemplary claim 1, on the other hand, provides a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate (e.g., see Application at page 3, line 17, through page 4, line 2). This feature is important for improving the external quantum efficiency of a semiconductor light-emitting element, light-condensing characteristic and light directivity (see Application at page 3, lines 9-15).

II. THE PRIOR ART REFERENCE

A. The IBM Reference

The Examiner alleges that IBM teaches the claimed invention of claims 1-2 and 5-6. Applicant submits, however, that IBM does not teach each and every feature of the claimed invention.

That is, IBM does not teach or suggest "*molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate*" as recited in claim 1.

The Examiner alleges that IBM teaches growing sapphire on silicon, wherein the silicon

layer has cavities. The Examiner attempts to rely on Figures 2A-2B and the Abstract of IBM to support her allegations. The Examiner, however, is clearly incorrect.

That is, nowhere, in these figure or this passage (nor anywhere else for that matter) does IBM teach or suggest a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. Indeed, IBM merely teaches using a silicon wafer having an etching pit as a negative die for the production of a sapphire styli.

The claimed invention provides a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. The plurality of irregularities formed on the seed substrate allows for molding to be easily performed so that a large number of microlense-shaped convex portions are arranged in a rear surface of the sapphire substrate.

IBM merely discloses that SiO_2 is grown on both sides of a bilaterally polished, n-type, crystal oriented silicon wafer. The SiO_2 is subsequently removed on the bottom side by buffered hydroflouric acid. The wafer is etched to form an etching pit (see IBM at Abstract). The etching pit is indicated by the lines (111) in Figure 2B. Figures 1 and 2B clearly show that there are no irregularities in the surface of the Si layer, the etching pit or the final sapphire styli (see Figure 1). Therefore, IBM clearly does not teach or suggest molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate.

Therefore, Applicant submits that there are elements of the claimed invention that are not taught or suggested by IBM. Therefore, the Examiner is respectfully requested to withdraw this rejection.

B. The Fujitsu Reference

The Examiner alleges that Fujitsu would have been combined with IBM to teach the claimed invention of claim 4. Applicant submits, however, that these references would not have been combined as alleged by the Examiner and that, even if combined, the combination of references would not teach or suggest each and every element of the claimed invention.

That is, there is no motivation to combine the references as alleged by the Examiner. Indeed, the Examiner has not even provided a motivation for combining the references.

Applicant points out to the Examiner that MPEP § 2142 states "[t]o establish a *prima*

facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings" (emphasis in MPEP) and that "it is the duty of the examiner to explain why the combination of the teachings is proper". The Examiner has not provided her reasoning for combining the references. Therefore, the Examiner has clearly not made a *prima facie* case of obviousness.

Moreover, neither Fujitsu, nor IBM, nor any combination thereof, teaches or suggests "*molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate*" as recited in claim 1.

The Examiner alleges that Fujitsu teaches a method of growing sapphire on a silicon substrate at a temperature of 600°C and heat treating the grown sapphire at a temperature of 1270°C to form an alpha sapphire substrate. The Examiner attempts to rely on the Abstract of Fujitsu to support her allegations. The Examiner, however, is clearly incorrect.

That is, nowhere in this passage does Fujitsu teach or suggest a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. Indeed, the Examiner does not even allege that Fujitsu teaches or suggests this feature. Therefore, Fujitsu does not make up the deficiencies of IBM.

Therefore, Applicant submits that even if combined, the alleged combination of references would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

C. The Kawama Reference

The Examiner alleges that Kawama would have been combined with IBM to teach the claimed invention of claim 3. Applicant submits, however, that even if combined, the combination of references would not teach or suggest each and every element of the claimed invention.

That is, neither Kawama, nor IBM, nor any combination thereof, teaches or suggests "*molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate*" as recited in claim 1.

The Examiner alleges that Kawama teaches etching silicon to separate the silicon from sapphire using HF. The Examiner attempts to rely on Figure 13b and column 23, lines 27-40 of Kawama to support her allegations. The Examiner, however, is clearly incorrect.

That is, nowhere in this passage or this figure (nor anywhere else for that matter) does Kawama teach or suggest a method of producing a crystal growth substrate that includes molding a seed substrate into a desired shape so that irregularities are provided to a sapphire growth surface of the seed substrate. Indeed, the Examiner does not even allege that Kawama teaches or suggests this feature. Therefore, Kawama does not make up the deficiencies of IBM.

Therefore, Applicant submits that even if combined, the alleged combination of references would not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to withdraw this rejection.

III. NEW CLAIMS

New claims 14-20 have been added to provide more varied protection for the claimed invention and to claim additional features of the invention. These claims are independently patentable because of the novel features recited therein.

Applicant respectfully submits that new claims 14-20 are patentable over any combination of the applied references at least for analogous reasons to those set forth above with respect to claim 1-9 and 12-13.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-9 and 12-20, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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